

COUNTRY BRIEF 18

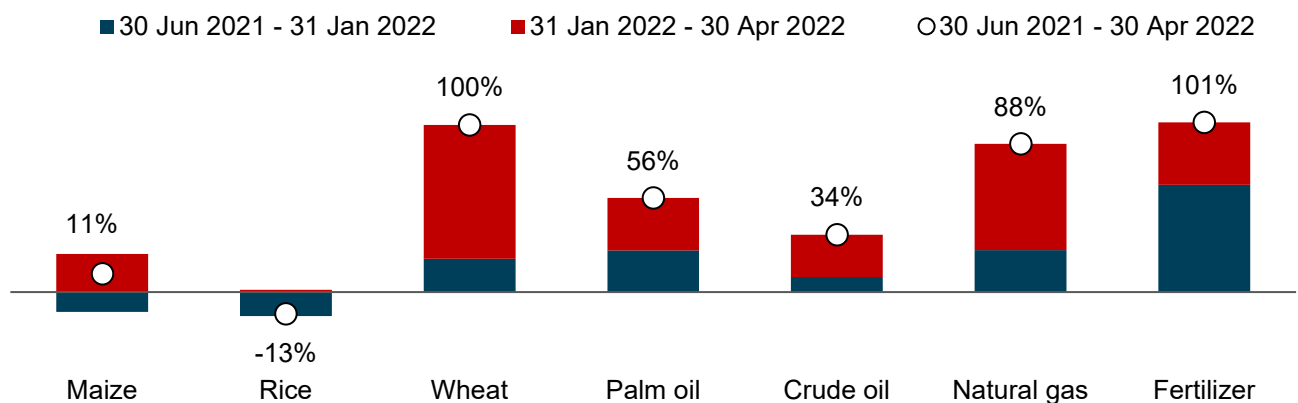
Egypt: Impacts of the Ukraine and Global Crises on Poverty and Food Security

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1. World Price Shocks and Domestic Price Transmission

Global food, fuel, and fertilizer prices have witnessed rapid and significant increase in recent months, driven largely by the fallout from the ongoing war in Ukraine and associated sanctions imposed on Russia. Other factors, including governments' responses and export bans, have also contributed to rising prices (Laborde and Mamun 2022). Palm oil and wheat prices increased by 56 and 100 percent in real terms, respectively, between June 2021 and April 2022, with most of the increase occurring since February 2022 (Figure 1).

Figure 1. Changes in global real commodity prices since mid-2021 (US dollars)



Source: Authors' calculations using data from World Bank Commodity Price Data (The Pink Sheet, <https://www.worldbank.org/en/research/commodity-markets>).

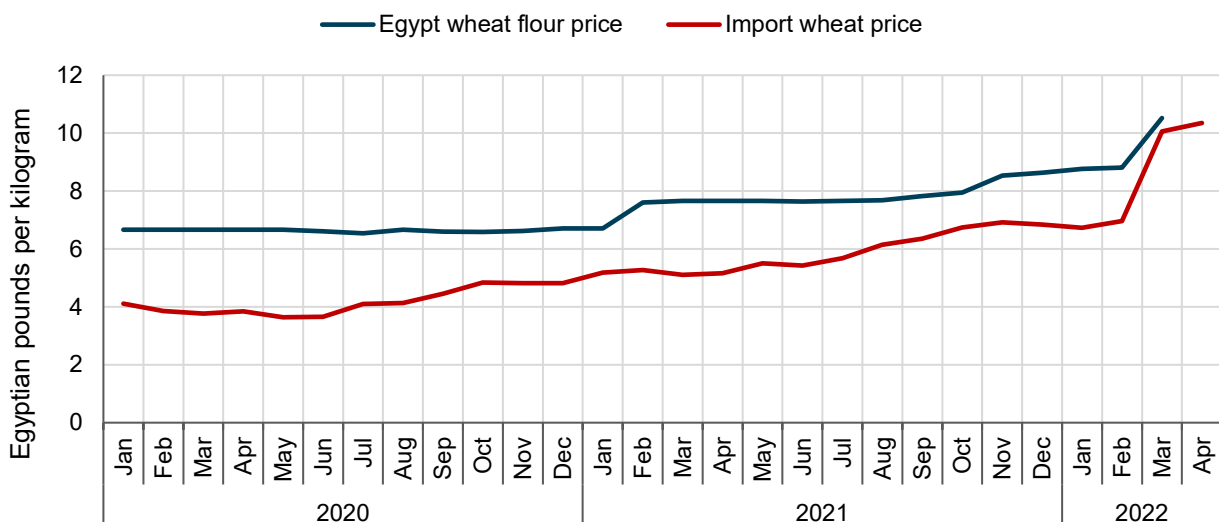
Note: Nominal prices in US dollars from World Bank Commodity Price Data (The Pink Sheet) are converted to real prices, which account for the overall increase in world prices over this period, deflated by the US consumer price index, which rose by 7.2 percent between June 2021 and April 2022.

¹ This study was conducted by IFPRI with financial support from BMGF, FCDO, and USAID. The study uses models developed with ongoing support from BMGF, USAID, and CGIAR's Foresight and Metrics Initiative. The study also benefited from funding by the CGIAR's National Policies and Strategies Initiative, IFPRI's Egypt country program (which is funded by the USAID through the project Evaluating Impact and Building Capacity (EIBC)), and researchers from the Faculty of Agriculture, Cairo University, and the Institute of National Planning. Fadi Abdelradi is with Cairo University, and all other authors are with IFPRI. For further information, please contact Kibrom Abay (k.abay@cgiar.org), Mariam Raouf (m.raouf@cgiar.org), Xinshen Diao (x.diao@cgiar.org), and James Thurlow (j.thurlow@cgiar.org).

Wide variation exists across products, with real maize prices increasing by only 11 percent and rice prices declining by 13 percent. The price of crude oil and natural gas has also risen substantially, while the weighted average price of fertilizer has doubled. With these changes in global prices, many low- and middle-income countries and their development partners are concerned about the implications for economic stability, food security, and poverty.

The Middle East and North Africa (MENA) region in general and Egypt in particular have been directly affected by the war unfolding in Ukraine, mainly because of high food import dependence. A regional vulnerability analysis by IFPRI shows that MENA countries such as Egypt, Sudan, and Yemen are particularly vulnerable to trade shocks induced by the Russian-Ukraine war (Abay et al. 2022a). For example, Egypt, the world's largest wheat importer, usually procures about 85 percent of its wheat imports from Russia and Ukraine, as well important supplies of other key agricultural products. UN Comtrade (2022) data show that Ukraine supplies about 30 percent of Egypt's corn imports, while Russia and Ukraine supply about 85 percent of sunflower oil. Because of these import dependencies, Egypt has witnessed a major surge in food prices. Data from Egypt's Central Agency for Public Mobilization and Statistics (CAPMAS 2022) show that immediately after the outbreak of the war, food price inflation reached a record five-year high of 20 percent in March 2022. This inflation is further fueled by export restrictions in several food exporting countries. A comparison of import wheat prices at Egypt's border with the country's domestic wheat prices suggests that world price changes have had a major direct influence on domestic prices (Figure 2), because wheat is Egypt's main staple crop and about 60 percent of wheat demand is satisfied through imports.

Figure 2. Nominal wheat prices in Egypt, 2020–2022



Source: Authors' calculations using data from FEWSNET, IGC, and World Bank Commodity Price Data (The Pink Sheet).

Note: Import prices include cost, insurance, and freight (CIF).

2. Measuring Impacts on Egypt's Economy and Population

We use an economywide model of Egypt to estimate the impacts of the global price shocks on all sectors, workers, and households.² The model allows us to capture a range of considerations that determine the overall impact of the crisis on the country. The effects of higher world food prices depend on the importance of the affected products in the total supply of each commodity and whether

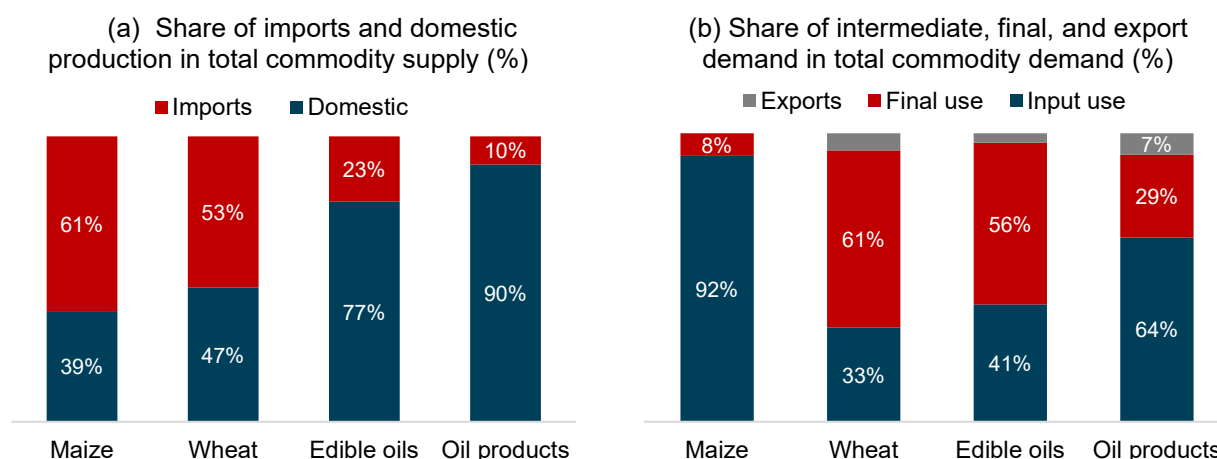
² Information on the Rural Investment and Policy Analysis (RIAPA) data and modeling system can be found at IFPRI (2022).

local producers and consumers can readily substitute away from higher-priced imports. Wheat is Egyptians' most important staple and a major source of calories, representing 39 percent of caloric intake per person. According to data from USDA-FAS (2022), the average Egyptian consumes about 145 kg of wheat a year—double the global average. Domestic production meets about 50 percent of wheat demand, making Egypt vulnerable to international wheat price shocks (Panel A in Figure 3). About 60 percent of Egypt's maize supply also comes from imports, including 30 percent from Ukraine.

Egypt exports large volumes of natural gas, while importing large amounts of crude oil, petrol, and other petroleum products.³ Egypt also produces most of the nitrogen and phosphate fertilizers used by its farmers.⁴ The impacts of higher world fuel and fertilizer prices on Egypt's economy are thus more complicated than on an economy without gas or oil exports or a large domestic fertilizer supply.

The impact of higher fuel prices on households cannot be directly assessed by looking only at the share of petroleum products in households' consumption baskets. This is because fuel is mainly used as an input into the production of other goods and services. About two-thirds of total domestic demand for petroleum and other oil products in Egypt is for input use, mainly by agriculture for irrigation and mechanization and by the transport sector. Moreover, exports of crude oil and petrol products account for 7 percent of total oil and oil products (Panel B in Figure 3). These patterns imply that international fuel price shocks are likely to affect local production systems, and the price transmission between global fuel prices and the domestic price of factors of production is shown to be strong (Dillon and Barrett 2016). Dillon and Barrett (2016) find that global crude oil prices transmit more quickly to pump/diesel prices and then to local maize prices than do global maize prices, suggesting immediate and major effects of global fuel price shocks on transport and irrigation costs. These impacts are likely to be pronounced in contexts like Egypt, where pump/diesel prices appear to be a major cost of production and farmers are sensitive to fuel prices.

Figure 3. Breakdown of commodity supply and demand in Egypt, 2019



Source: Authors' calculations using social accounting matrix (SAM) data (IFPRI 2021) from IFPRI's Egypt RIAPA model.

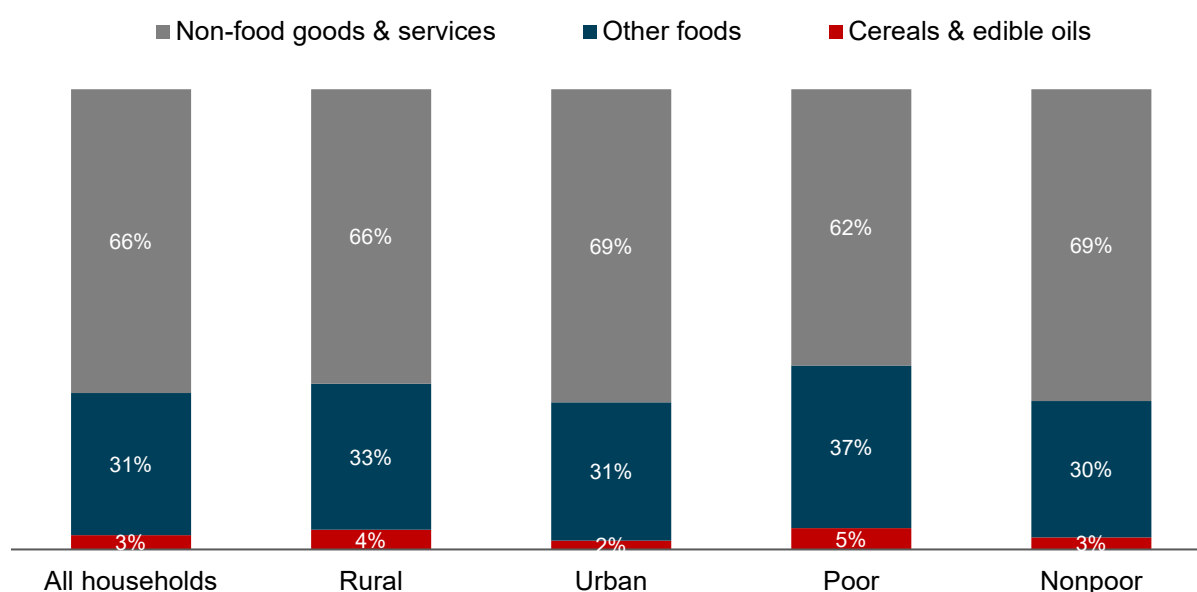
Note: Wheat includes grains and flour in Panel B. Oil products include crude oil, petroleum, and other oil products. Input use includes grains as intermediates in flour processing, while grain flours can also be used as intermediates in the production of other processed foods (excluding flours) and by some service sectors such as restaurants and hotels. Final use includes private and public consumption and gross capital formation.

³ Egypt also exports modest amount of crude oil, while the amount of crude oil imports far exceeds exports.

⁴ Egypt produces 6 million tons of nitrogen and 2 million tons of phosphate fertilizers while also exporting 3 million tons of nitrogen and 0.6 million tons of phosphate fertilizers (MALR inputs report, 2019).

Impacts on household welfare also depend on the importance of commodities in their consumption baskets. While cereals and edible oils account for a small share of the total value of household consumption (3 percent) in Egypt (Figure 4), breads, which are included in other foods, are major staples for Egyptian households.⁵ Breads are highly subsidized in Egypt. At the subsidized prices, breads together with other grain products comprised 15.5 percent of total consumption for the poorest decile of households and 11 percent for the richest decile in 2017/18 (World Bank 2022). However, as discussed above, wheat and bread represent a major source of calories for households, and especially for poorer households (Abay et al. 2022a). IFPRI's economywide model tracks income and expenditures for different population groups and is linked to a survey-based micro-simulation tool that tracks the consumption patterns of individual households. Disaggregating impacts across various groups of populations is crucial because the shares of cereals and edible oils as well as breads in expenditures are much larger for poorer households in Egypt than for other groups.

Figure 4. Composition of household consumption spending in Egypt, 2019



Source: Authors' calculations using social accounting matrix (SAM) data (IFPRI 2021) from IFPRI's Egypt RIAPA model.

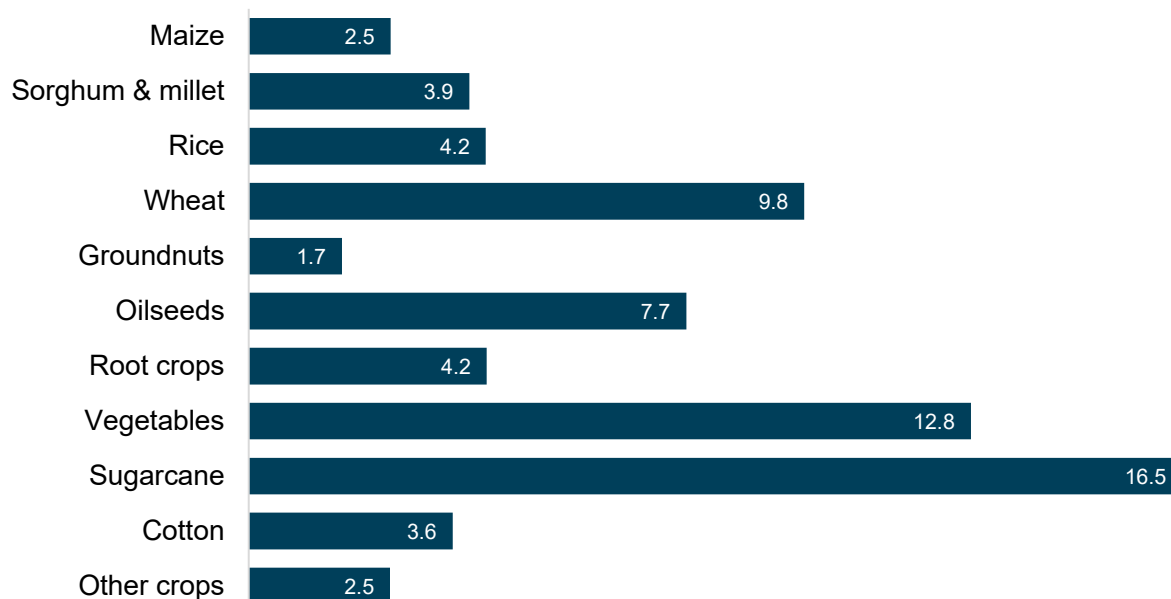
Note: Breads are Egyptians main staples. Here they are included in processed food, rather than the cereals and edible oils group. The high subsidies on breads have made cereals and edible oils a very small portion of consumers' total expenditures, especially in urban area.

Rising fertilizer prices may cause some farmers to reduce their use of this input, leading to lower agricultural production and higher prices for many locally grown crops. The magnitude of this decline depends on: (1) the responsiveness of fertilizer demand to changes in prices; (2) the amount of fertilizer currently used to grow crops; and (3) the expected productivity losses for farmers who reduce their use of fertilizers. Irrigated agriculture predominates in Egypt, and almost all crops apply chemical fertilizer with adoption rates close to 100 percent for many crops (Abay et al. 2022b). However, the cost share of fertilizer use varies significantly by crop. Most smallholders in Egypt receive quotas of subsidized fertilizer from the government, and additional fertilizer is obtained from fertilizer markets and paid at market prices (Kurdi et al. 2020). The variation of the cost shares of fertilizer in total output value across individual crops is mainly due to fertilizer use intensity and the amount of fertilizer purchased from the market. For our initial impact analysis, we adopt a conservative set of assumptions regarding farmers' responses to rising fertilizer prices. We assume an own-price elasticity of fertilizer demand of -0.15 , implying that a 100 percent increase in real fertilizer prices leads to a

⁵ These figures include the imputed value of home consumption, which is also tracked within the RIAPA model.

15 percent decline in fertilizer use. Drawing on recent survey analysis, we assume that farmers who do not use chemical fertilizers are about 20 percent less productive than farmers who do.⁶

Figure 5. Share of chemical fertilizer costs in value of crop output in Egypt (percentage)



Source: Authors' calculations using social accounting matrix (SAM) data (IFPRI 2021) from IFPRI's Egypt RIAPA model.

We simulate the effects of both higher world prices (recall Figure 1) and the potential productivity losses from reduced fertilizer use in the current growing season. Simulation results should be interpreted as “medium-term” impacts; that is, after the immediate spillover effects across sectors and households have occurred but before the government and private sector make significant changes to their policies in response to the crisis. That is, our analysis is focused on the impact of external shocks to the economy, ignoring domestic government policies and responses, many of which have already been launched. Assessing policy responses will be the task of our second phase analysis (see Section 5 for next steps). Besides these household-level impacts of higher world prices, our economywide models also consider the implication of these price increases for government revenue. This is particularly important for countries like Egypt that export fertilizer and natural gas.

3. Impacts on Egypt's Economy and Agrifood System

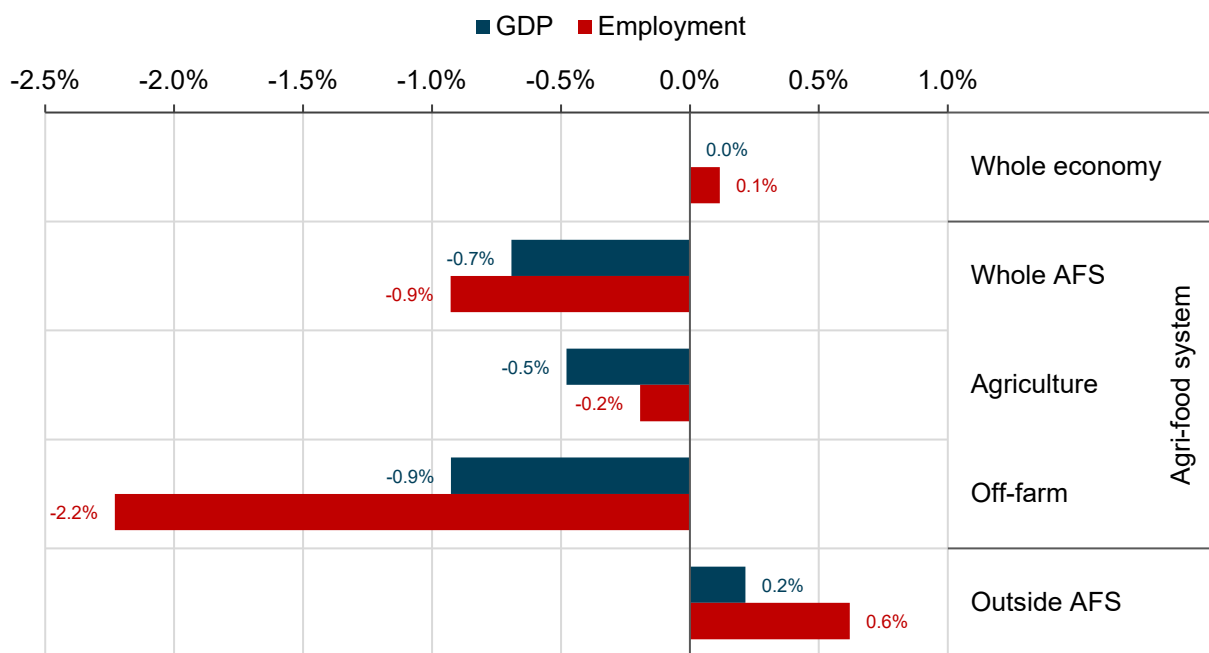
Impacts of higher world prices on national GDP and employment are less than initially feared while the agrifood system suffered most. As an exporter of natural gas and fertilizers, Egypt's windfall revenues from higher natural gas prices are expected to have mainly gone to the government. However, Egypt imports crude oil and petrol, and Egyptian farmers use fertilizers intensively in crop production. Higher fuel and fertilizer prices thus create negative shocks on the economy, which is the reason that the initial expectation in the country is that the shocks could cause Egypt to suffer a significant reduction in national total GDP.⁷ On the other hand, Egypt also exports petroleum and fertilizers, and higher prices for petrol and fertilizer products could motivate local firms to

⁶ The final impact on crop productivity is: [Change in domestic market price] × [Price elasticity of demand] × [Share of cultivated land using fertilizer] × [Productivity gain from using fertilizer per hectare].

⁷ For example, growth in Egypt's GDP forecast was lowered from 5.5 percent to 4.5 percent for 2022-2023 by the government ([Enterprise, 2022](#)).

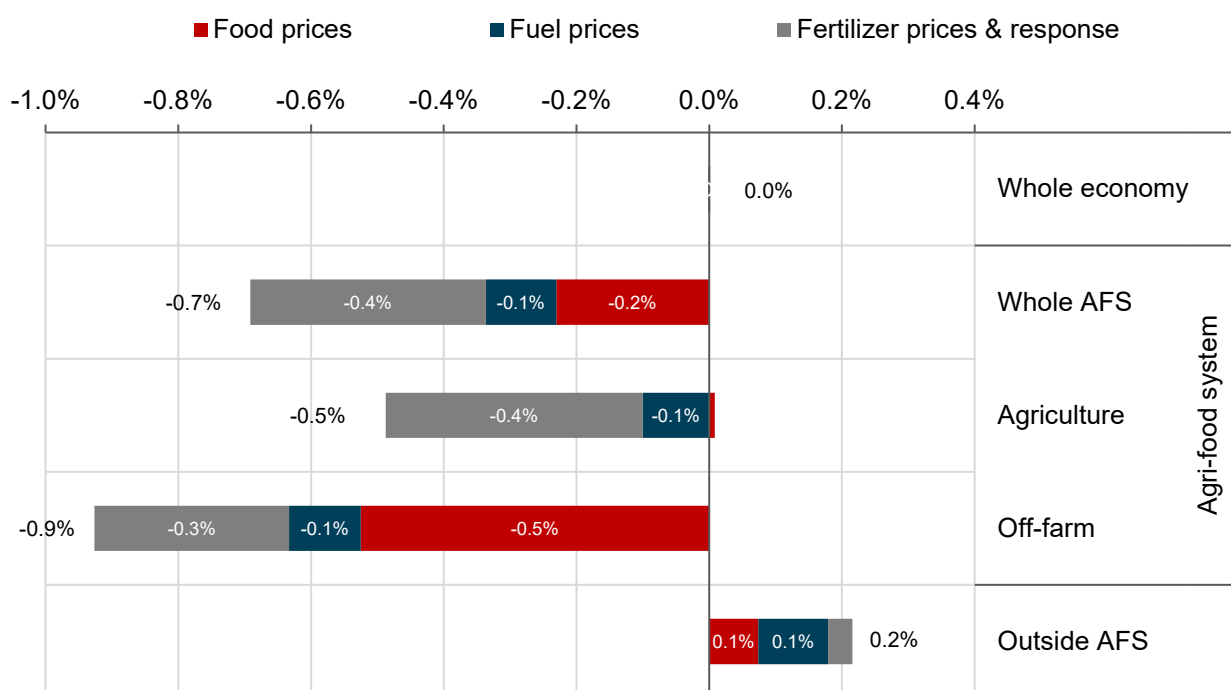
expand production and increase exports. The benefits from increased production and exports offset the negative effects from imports of higher priced crude oil and petrol products at the national level, as measured by total GDP, while the agrifood system is adversely affected by the world price shocks. Total GDP of the agrifood system falls by 0.7 percent, while agrifood employment falls by 0.9 percent (Figure 6). Within the agrifood system, off-farm components see a larger impact, with their GDP declining by 0.9 percent. Off-farm agrifood employment falls much more (by 2.2 percent) because higher food and fuel prices raise costs of food processing and food-related services. The GDP and employment impacts in the rest of the economy outside the agrifood system are negligible. The modest gains in the rest of the economy's GDP are led by fertilizer, natural gas, and petrol exports, while the gains in employment are led by more labor-intensive nontradable service sectors.

Figure 6. Percentage change in total and sectoral GDP and employment due to food, fuel, and fertilizer shocks



Source: Simulation results from IFPRI's Egypt RIAPA model.

The negative effects on agriculture GDP come mainly from fertilizer shocks. Production of many cereal and cash crops is fertilizer intensive in Egypt. Indeed, smallholder farmers in Egypt use more than the recommended level of fertilizer application, potentially because of looming land constraints and associated pressure to increase yields (Kurdi et al. 2020; Abay et al. 2022b). The negative effect from higher fertilizer prices results in falling crop productivity due to reduced use of fertilizer, which is the primary reason for agriculture GDP losses (Figure 7). Figure 7 also shows that there is little effect on primary agriculture GDP from rising food prices, because higher import prices motivate the expansion of domestic production that partially substitutes for imports. However, within the agrifood system outside agriculture, food price shocks have a large adverse impact on off-farm GDP, as rising food prices increase costs of food processing sectors and lower their production. Food-related services, particularly restaurants and hotels, are also negatively affected by higher food prices that increase their operational costs.

Figure 7. Percentage change in total and sectoral real GDP decomposed by food, fuel, and fertilizer shocks

Source: Simulation results from IFPRI's Egypt RIAPA model.

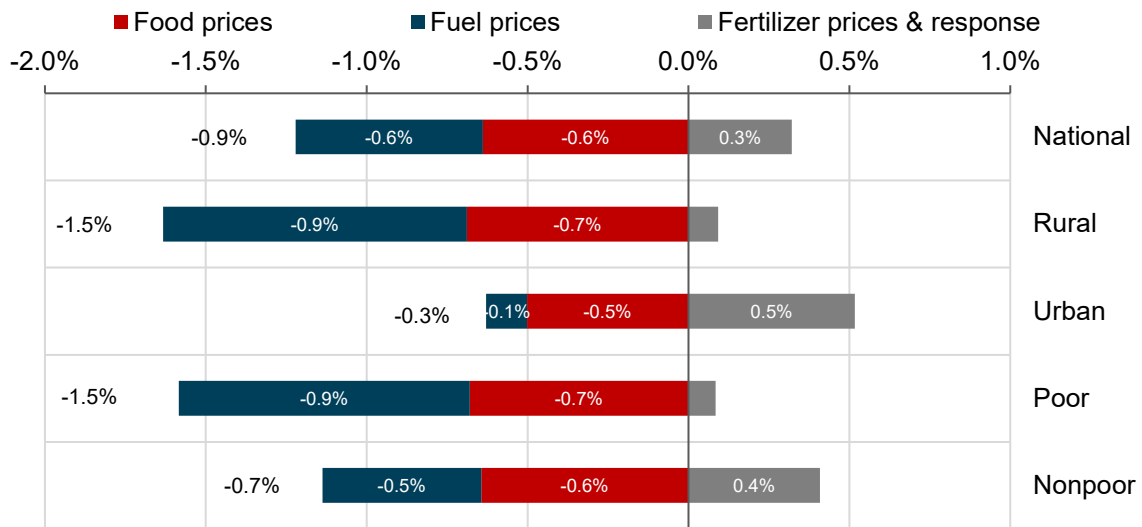
Note: About 40 percent of the effect on agricultural GDP under "fertilizer prices and response" is directly from rising fertilizer prices, while the remaining 60 percent is from the productivity shock caused by lower fertilizer use.

4. Impacts on Household Poverty, Inequality, and Diets in Egypt

Household consumption falls, with larger losses for poorer and rural households. With wind-fall revenues from natural gas exports accruing to the government, most households do not benefit directly from rising fuel prices.⁸ In fact, national real consumption, including household consumption, falls by 0.9 percent (Figure 8). Most households are hit twice, by rising prices and falling incomes due to the negative impact of higher prices on production. Moreover, food accounts for a much larger share of household consumption than of GDP, and hence, consumption is more sensitive to the rising food prices. At the national level for all households as whole, the decline in consumption is driven by the fuel and food price shocks at a similar scale, while differential impacts of the shocks on consumption outcomes are observed across population groups. Rural and poor households are affected much more than urban households. Moreover, the negative impact of fuel shocks is larger for rural households than for urban households. This is in part because fuel is widely used in irrigation and mechanization for agriculture, and thus, fuel shocks have a negative effect on agricultural production and lower the incomes of rural households. Higher fuel prices hurt all households as consumers. However, because Egypt also exports petrol, some urban households that are engaged in petrol-related production and service activities could be less negatively affected by fuel shocks. Egypt produces most domestically used fertilizer and also exports fertilizer. Thus, the impact of fertilizer shocks is positive for urban households, which again, is due to the income effect from potential expansion of fertilizer production.

⁸ The government has expanded its social protection targeting the poor and implemented some other related interventions. The current analysis assesses the impact of global shocks without taking into consideration of the policy responses and their impacts for mitigating the negative effects of the shocks.

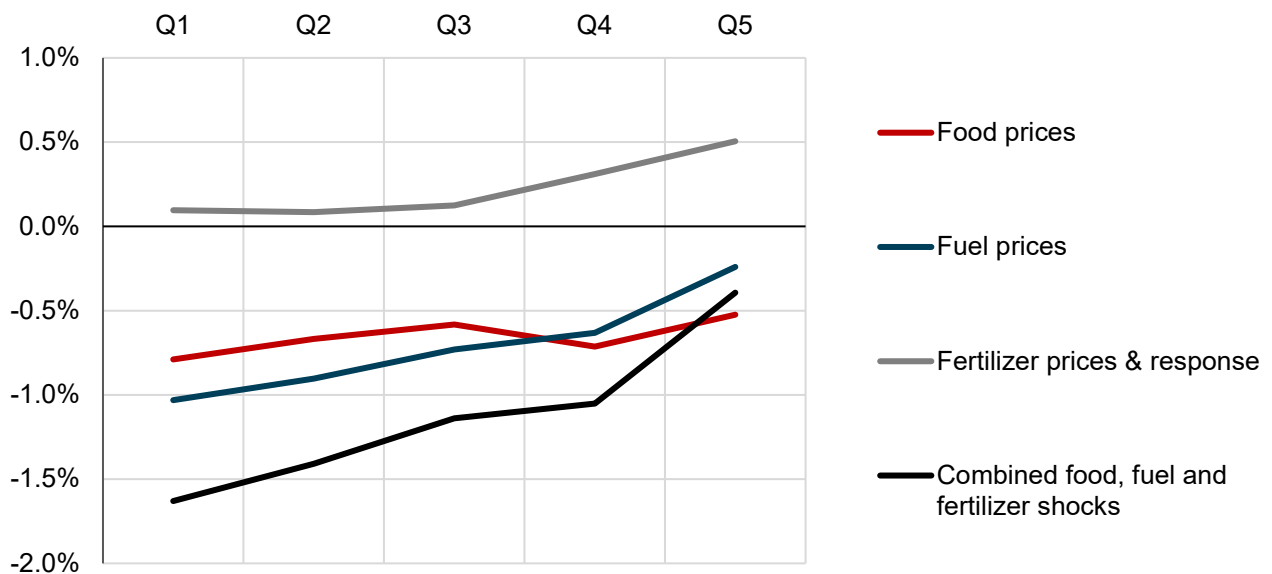
Figure 8. Percentage change in real household consumption due to food, fuel, and fertilizer shocks



Source: Simulation results from IFPRI's Egypt RIAPA model.

Inequality increases, although all households are adversely affected. The food, fuel, and fertilizer shocks have different implications for (income) inequality in Egypt. The fuel shock has a larger negative impact on incomes and real consumption for poorer households in the lower quintiles than for richer households in the top quintile (Figure 9), causing inequality to increase. Food price shocks affect all households, with a similar impact across all income quintiles. Fertilizer shocks have little impact on the three lowest quintiles and have a positive impact for the households in the top quintiles. Overall, the combined effect of the world price shocks is a decline in consumption for all households, but much larger declines for households toward the lower end of the income distribution. The result of the global crises is therefore an increase in inequality within Egypt.

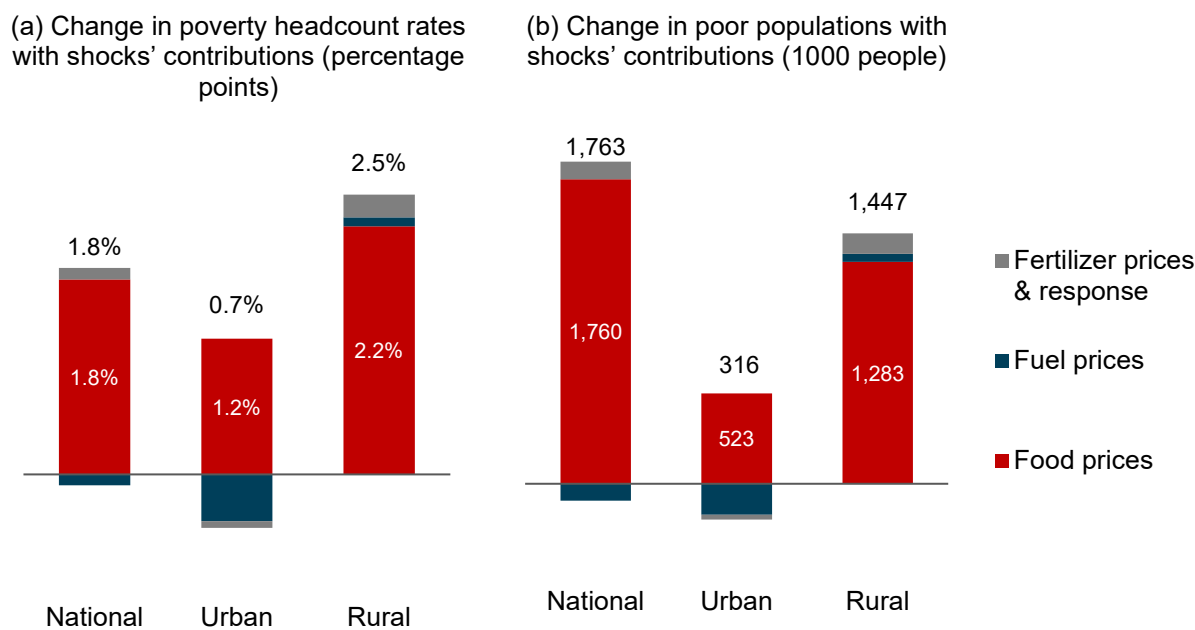
Figure 9. Percentage change in real household consumption across per capita expenditure quintiles



Source: Simulation results from IFPRI's Egypt RIAPA model.

Falling household consumption leads to greater poverty, particularly in rural areas. According to the most recent household survey in Egypt, more than 30 percent of the country's population has an adult equivalent consumption level that falls below the national poverty line. The increase in world prices reduces real expenditures of lower-income households, increasing the national poverty headcount rate by 1.8 percentage points (Panel A in Figure 10). This is equivalent to an additional 1.76 million people falling below the national poverty line (Panel B). The impact on the rural poverty rate is larger, and 1.45 million of the increased poor population live in rural areas.

Figure 10. Changes in poverty due to food, fuel, and fertilizer shocks



Source: Simulation results from the survey-based microsimulation module within IFPRI's Egypt RIAPA model.

Notes: Poverty headcount rate is the share of the population with daily adult equivalent consumption levels below the national poverty line, which is 32.5 percent in 2017/18. The rural poverty rate of 38.3 percent is higher than the urban poverty rate of 24.7 percent.

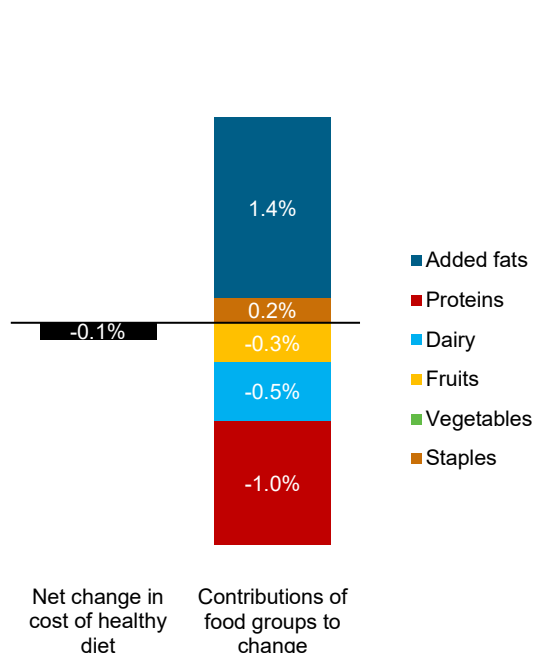
The total real cost of a healthy diet is little affected by the global price shocks for Egyptian households. The model tracks changes in the cost of a “healthy” reference diet (CoRD) with six food groups as defined by the EAT-Lancet Commission.⁹ The combined food, fuel, and fertilizer shocks do not affect the CoRD in real terms (the first bar in Panel A in Figure 11).¹⁰ Rising prices for edible oils (in added fats) and for wheat (in staples) push up their costs, while falling household incomes reduce demand for fruits, dairy, and protein foods, and thus lower their costs (the second bar in Panel A in Figure 11). The “staples” food group includes cereals and root crops, which are affected by higher wheat import prices. However, achieving the diversity of the healthy reference diet requires a decline in the large share of cereals in the average household diet. As such, the increase in wheat prices has a modest contribution to the changing cost of a healthy diet. On the other hand, consumption levels of dairy, vegetables, and protein products are far below the required level for a healthy diet among many households in Egypt. Thus, the falling costs of these food groups mask households' deteriorating access to these foods due to lower income.

⁹ For further information on the RIAPA model's diet module and indicators, see Pauw et al. (2021).

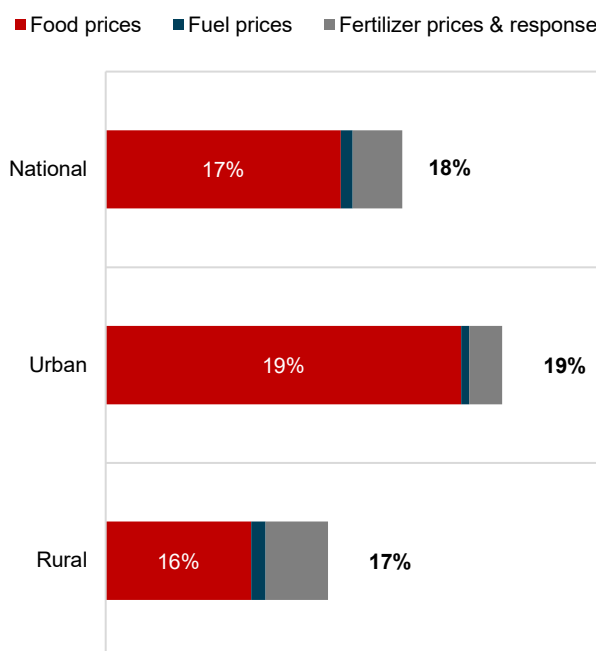
¹⁰ The CoRD is estimated using calorie targets from EAT-Lancet (for major food groups) and the World Bank's International Comparison of Prices (IPC) dataset. The estimated budget shares for the healthy diet include: staples (17.1 percent), vegetables (16.1), fruits (12.6), dairy (14.2), proteins (33.6), and added fats (6.4).

Figure 11. Changes in diet costs and household diet deprivation due to food, fuel, and fertilizer shocks

(a) Changes in the real cost of a healthy reference diet, with contributions from the six major food groups (%)



(b) Share of population to become deprived in at least one additional food group for a healthy diet (%)



Source: Simulation results from the survey-based microsimulation module within IFPRI's Egypt RIAPA model.

Diet quality worsens for many households. The survey-based micro-simulation tool also measures the increases in number of people with deteriorated diet quality. People are considered deprived in a food group if they obtain fewer calories from that food group than recommended by the healthy reference diet. Prior to the crises, many Egyptian households did not have the consumption levels and diversity needed for a healthy diet. Rising food prices are the most important factor for worsening diet quality, and cause 18 percent of people to become deprived in at least one additional food group. Many of the households with deteriorated diet quality are not poor, as only wealthier households could afford enough calories from more diverse groups of foods prior to the crisis. Poor households, particularly rural households, already suffered from food deprivations among most food groups (other than the staples group, in which cereals and particularly wheat dominate). Thus, the poor have little scope for a further increase in food deprivations. This is why more urban households (19 percent of urban population) suffer deteriorated diet quality than rural households (17 percent of the rural population) facing the global shocks (Panel B in Figure 11).

5. Summary and Next Steps in the Analysis

We used IFPRI's economywide model—known as RIAPA—to simulate the impacts of the global crises on Egypt's economy and population. The model allows us to track the direct and indirect effects of rising world prices, taking account of key considerations that will determine the overall impact. These include, for example: the share of imports in total product supply; the importance of different sectors and products for household employment, income, and consumption levels; and farmers' responses to rising fertilizer prices and the knock-on effect this could have on next season's agricultural production.

Our analysis indicates that for Egypt, a natural gas and fertilizer exporter and wheat/maize importer, the impact of the global crisis on total GDP and employment is much less than initially feared. However, the agrifood system is adversely affected, with GDP and employment falling in both the on-farm and off-farm agrifood system. Most of the agricultural GDP losses are driven by rising fertilizer prices, rather than higher food prices. This is because, although import prices of wheat and edible oils are rising, these products are also produced domestically in Egypt. To some extent, rural farmers also benefit from higher prices for agricultural products, although the net effect on their welfare is negative once we account for the effects of higher fertilizer prices, higher fuel prices, reduced fertilizer use, and lower agricultural productivity.

Overall, with the windfall revenue mostly accruing to the government and little going to consumers, household consumption falls. Impacts are larger on poorer and rural households, leading to increased inequality in Egypt. Because of the relatively higher poverty rate among rural households, falling household consumption leads to a greater increase in poverty among rural households than among urban households. Finally, while the total cost of a healthy diet does not increase for Egyptian households, the gap between household consumption levels and what is required to achieve a healthy diet widens because of the negative income effect. While the global crises will not greatly affect Egypt's economy, its adverse impacts on poor people and food insecurity are likely to be more pronounced.

We note that this is a first-stage analysis of the likely impact of the global crisis triggered by the Russia-Ukraine war. Our analysis focused on the impact of external shocks to the economy, ignoring domestic government policies and responses. The government of Egypt has launched major fiscal and monetary policy instruments to limit the crises' adverse effects. Immediately after the outbreak of the Russia-Ukraine conflict, the government announced a price cap on unsubsidized bread while also increasing planned wheat procurement from the domestic market through a combination of offering higher prices to farmers and other incentives to wheat farmers (Enterprise 2022). The government also announced the expansion of social protection programs to reach more vulnerable people as well as tax relief for firms and salary increases for civil servants. These fiscal policy responses are likely to cushion some of the adverse impacts of the surge in food and energy prices. The government of Egypt also devalued its currency by 17 percent while increasing the interest rate immediately after the outbreak of the Russia-Ukraine conflict. These fiscal and monetary policy instruments are likely to have important impacts for Egypt's economy and households. Our next-stage analysis aims to evaluate and simulate the likely impact of these policies and instruments.

This study is part of a series of case studies that IFPRI is undertaking using economywide models to capture current world market shocks on developing countries. The analysis presented above is an initial impact assessment designed to gauge the vulnerability of countries and key population groups. Subsequent analyses will simulate the mitigating effects of different policy and investment options, including the potential roles of cash transfers, food aid, and subsidies for food, fuel, and fertilizers. Particular attention will be paid to possible synergies and trade-offs between these policy responses, including their implications for government budgets and longer-term development goals.

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